



IFW

00169.101880

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)
ANDREW FRIEDMAN) : Examiner: Unassigned
Application No.: 10/803,987) : Group Art Unit: Unassigned
Filed: March 19, 2004) :
For: AUTOMATIC TRACK) :
GENERATION) : June 1, 2004

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

SUBMISSION OF PRIORITY DOCUMENT

Sir:

In support of Applicant's claim for priority under 35 U.S.C. § 119, enclosed is
a certified copy of the following foreign application:

2003-901314, filed March 21, 2003.

Applicant's undersigned attorney may be reached in our Washington, D.C.
office by telephone at (202) 530-1010. All correspondence should continue to be directed to our
address given below.

Respectfully submitted,



Attorney for Applicant
Registration No. 32,078

FITZPATRICK, CELLA, HARPER & SCINTO
30 Rockefeller Plaza
New York, New York 10112-3800
Facsimile: (212) 218-2200
CPWgmc



Australian Government

Appln. No. 10/803,987
Filed - 03/19/04
Andrew Friedman, inventor

Patent Office
Canberra

I, JULIE BILLINGSLEY, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. 2003901314 for a patent by CANON INFORMATION SYSTEMS RESEARCH AUSTRALIA PTY LTD as filed on 21 March 2003.

WITNESS my hand this
Thirty-first day of March 2004

6

A handwritten signature in cursive script, reading "J. Billingsley".

JULIE BILLINGSLEY
TEAM LEADER EXAMINATION
SUPPORT AND SALES

ORIGINAL

AUSTRALIA

Patents Act 1990

PROVISIONAL SPECIFICATION FOR THE INVENTION ENTITLED:

Automatic Track Generation

Name and Address of Applicant:

Canon Information Systems Research Australia Pty Ltd, an Australian Company,
ACN 003 943 780, of 1 Thomas Holt Drive, North Ryde, New South Wales,
2113, Australia

Name of Inventor:

Andrew Friedman

This invention is best described in the following statement:

AUTOMATIC TRACK GENERATION

Field of the Invention

The current invention relates to video editing and in particular to multiple track editing.

5

Background

Video and audio productions often comprise multiple independent tracks. For example, a typical motion picture comprises a single video track, and two or more audio tracks. During the creation process for such productions, technicians frequently deal with more tracks than will be used in the final production. In the editing phase of the creation, 10 editors separately edit these individual tracks to produce desired outcomes, but they remain mindful of the combined effect.

In the course of editing video and audio productions it is often important that one track stays synchronised with another. For example, the video of a actors lip movements is commonly closely synchronised with the relevant audio relating the actors words. As 15 time related aspects of a "source" video track relating to the actors lips are edited (deleted, inserted or moved etc.) the related (synchronised) "dependent" audio is correspondingly edited in cases where is desired to maintain this synchronised relationship.

In many computer-based non-linear editors the editing systems display a 20 visualisation, often referred to as a timeline, of the multiple tracks being edited. This mechanism enables a user to observe a loss of synchronisation between tracks and to manually restore the relationship by editing the dependant tracks. This is however a tedious and error prone approach, since the user needs to continually adjust one or other track to take account of relative changes between the tracks.

Some systems allow synchronisation between different tracks to be maintained by 'locking' together the separate tracks. This enables the system to automatically preserve a synchronised timing relationship between the tracks. For some track types this locked type of synchronisation is, however, not desirable. Thus, for example, tracks such as background music or overlay video while dependent on a source video track, should be re-generated whenever the source track changes, rather than precisely reflecting the changes to the source track.

For example, consider the required changes to a dependent audio background music track, and a dependent audio dialog track when an associated source video track is edited. If some content is deleted between time T_1 and time T_2 from the source video track, the corresponding content needs to be deleted from the dependent dialog track. This corresponding content should not, however, be deleted between these time instants in the dependent background music track, since to do so would cause a discontinuity in the background music track. A more palatable solution is for the duration of the background music track to be shortened by $T_2 - T_1$. Similarly, the dependent background music track may have its duration increased in response to content being inserted in the source video track, possibly requiring looping if the total duration of the dependent background music track is not sufficient.

Mechanisms for providing automatic synchronisation in current systems are complex, for one or more of the following reasons:

- If synchronisation of a dependent track, with reference to a region of a source track, is possible at all, it is generally necessary to define both a beginning and end position of that region of the source track to which the dependent track is to be synchronised.

- The aforementioned regions of the source track cannot simply be redefined while preserving properties of the generated dependent track. For example the definition of the media to be used for the generated dependent track is not preserved. In other words, the region of the source track to which the dependent track is synchronised cannot be redefined without removing the synchronisation entirely, and defining it anew. This redefinition requires the attributes of the synchronisation, including which media is to be used in the generation of the relevant portion of the dependent track, to be redefined.
- Users typically need to consider how the synchronisation method is operating, and need to incorporate this factor in their editing rather than being able to focus on the key task of editing tracks.

There are also problems in integrating automatic synchronisation in systems that provide manual post-editing of automatically generated productions. Typically these systems are designed for users with limited experience of computers and/or video editing. Such users may simply desire the convenience of a system that is simple to use. In these systems, the automatic editing rules have been designed by professionals to ensure a good result, but the systems lack robust mechanisms to ensure that the intent of the professional is preserved throughout the editing process.

Summary of the Invention

It is an object of the present invention to substantially overcome, or at least ameliorate, one or more disadvantages of existing arrangements.

Disclosed are arrangements which seek to address the above problems by loosely synchronizing, to a source media item, a dependent media item, so that the dependent media item is coupled to the source media item, the coupling being subject to moderation by other media items in the neighbourhood of the source media item.

According to a first aspect of the present invention, there is provided a method of generating, in relation to a source placeholder, a dependent media item, said method comprising the steps of:

determining, from an EDL element associated with the source placeholder, a
5 plurality of track control attributes; and

establishing the dependent media item according to the track control attributes.

Other aspects of the invention are also disclosed.

Brief Description of the Drawings

One or more embodiments of the present invention will now be described with
10 reference to the drawings, in which:

Fig. 1 is a functional block diagram of a general-purpose computer upon which the described methods for automatic track generation can be practiced;

Fig. 2 shows relationships between a source Edit Display List (EDL), an associated source media track, and an associated dependent media item;

15 **Fig. A** shows track control attributes aggregated within an EDL element of a source media item;

Fig. B shows successive EDL elements for a track, the EDL elements containing media item information and track control attributes with values shown for a number of attributes;

20 **Fig. C** shows an alternate data structure for EDL elements of the source track in question, the EDL elements containing the same media item information and track attributes as **Fig. B**;

Figs. Da and Db show visual representations of source tracks and associated dependent overlay tracks generated from the EDL of the source tracks;

Fig. E is a tabular representation of the attributes associated with **Figs Da** and **Db**;

Fig. F shows a process for generating a dependent track from a source track; and

Fig G shows an example of a Graphical User Interface (GUI) allowing user
5 interaction to the automatic track generation method.

Detailed Description including Best Mode

It is to be noted that the discussions contained in the "Background" section relating to prior art arrangements relate to discussions of documents or devices which form public knowledge through their respective publication and/or use. Such should not
10 be interpreted as a representation that such documents or devices in any way form part of the common general knowledge in the art.

Where reference is made in any one or more of the accompanying drawings to steps and/or features, which have the same reference numerals, those steps and/or features have for the purposes of this description the same function(s) or operation(s), unless the
15 contrary intention appears.

Some portions of the description that follows are explicitly or implicitly presented in terms of algorithms and symbolic representations of operations on data within a computer memory. These algorithmic descriptions and representations are the means used by those skilled in the data processing arts to most effectively convey the
20 substance of their work to others skilled in the art. An algorithm is here, and generally, conceived to be a self-consistent sequence of steps leading to a desired result. The steps are those requiring physical manipulations of physical quantities. Usually, though not necessarily, these quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated. It has proven

convenient at times, principally for reasons of common usage, to refer to these signals as bits, values, elements, symbols, characters, terms, numbers, or the like.

It should be borne in mind, however, that the above and similar terms are to be associated with the appropriate physical quantities and are merely convenient labels applied to these quantities. Unless specifically stated otherwise, and as apparent from the following, it will be appreciated that throughout the present specification, discussions utilizing terms such as "scanning", "calculating", "determining", "replacing", "generating" "initializing", "outputting", or the like, refer to the action and processes of a computer system, or similar electronic device, that manipulates and transforms data represented as physical (electronic) quantities within the registers and memories of the computer system into other data similarly represented as physical quantities within the computer system memories or registers or other such information storage, transmission or display devices.

The present specification also discloses apparatus for performing the operations of the methods. Such apparatus may be specially constructed for the required purposes, or may comprise a general purpose computer or other device selectively activated or reconfigured by a computer program stored in the computer. The algorithms and displays presented herein are not inherently related to any particular computer or other apparatus. Various general-purpose machines may be used with programs in accordance with the teachings herein. Alternatively, the construction of more specialized apparatus to perform the required method steps may be appropriate. The structure of a conventional general purpose computer will appear from the description below.

In addition, the present specification also discloses a computer readable medium comprising a computer program for performing the operations of the methods. The computer readable medium is taken herein to include any transmission medium for

communicating the computer program between a source and a designation. The transmission medium may include storage devices such as magnetic or optical disks, memory chips, or other storage devices suitable for interfacing with a general-purpose computer. The transmission medium may also include a hard-wired medium such as exemplified in the Internet system, or wireless medium such as exemplified in the GSM mobile telephone system. The computer program is not intended to be limited to any particular programming language and implementation thereof. It will be appreciated that a variety of programming languages and coding thereof may be used to implement the teachings of the disclosure contained herein.

Fig. 1 shows how the method of automatic track generation particularly lends itself to implementation on a general-purpose computer system 100, such as that shown in Fig. 1 wherein the process of Fig. F may be implemented as software, such as an application program executing within the computer system 100. In particular, the steps of method of automatic track generation are effected by instructions in the software that are carried out by the computer. The instructions may be formed as one or more code modules, each for performing one or more particular tasks. The software may also be divided into two separate parts, in which a first part performs the automatic track generation methods and a second part manages a user interface between the first part and the user. The software may be stored in a computer readable medium, including the storage devices described below, for example. The software is loaded into the computer from the computer readable medium, and then executed by the computer. A computer readable medium having such software or computer program recorded on it is a computer program product. The use of the computer program product in the computer preferably effects an advantageous apparatus for automatic track generation.

The computer system 100 comprises a computer module 101, input devices such as a keyboard 102 and mouse 103, output devices including a printer 115, a display device 114 and loudspeakers 117. A Modulator-Demodulator (Modem) transceiver device 116 is used by the computer module 101 for communicating to and from a communications network 120, for example connectable via a telephone line 121 or other functional medium. The modem 116 can be used to obtain access to the Internet, and other network systems, such as a Local Area Network (LAN) or a Wide Area Network (WAN), and may be incorporated into the computer module 101 in some implementations.

10 The computer module 101 typically includes at least one processor unit 105, and a memory unit 106, for example formed from semiconductor random access memory (RAM) and read only memory (ROM). The module 101 also includes an number of input/output (I/O) interfaces including an audio-video interface 107 that couples to the video display 114 and loudspeakers 117, an I/O interface 113 for the keyboard 102 and mouse 103 and optionally a joystick (not illustrated), and an interface 108 for the modem 116 and printer 115. In some implementations, the modem 116 may be incorporated within the computer module 101, for example within the interface 108. A storage device 109 is provided and typically includes a hard disk drive 110 and a floppy disk drive 111. A magnetic tape drive (not illustrated) may also be used. A CD-ROM drive 112 is typically provided as a non-volatile source of data. The components 105 to 113 of the computer module 101, typically communicate via an interconnected bus 104 and in a manner that results in a conventional mode of operation of the computer system 100 known to those in the relevant art. Examples of computers on which the described arrangements can be practised include IBM-PC's and compatibles, Sun Sparcstations or like computer systems evolved therefrom.

Typically, the application program for automatic track generation, as well as the media item files associated with source and dependent media tracks, are resident on the hard disk drive 110 and read and controlled in its execution by the processor 105. Intermediate storage of the program and any data fetched from the computer memory 109 or the network 120 may be accomplished using the semiconductor memory 106, possibly in concert with the hard disk drive 110. In some instances, the application program for automatic track generation may be supplied to the user encoded on a CD-ROM or floppy disk and read via the corresponding drive 112 or 111, or alternatively may be read by the user from the network 120 via the modem device 116. Still further, the software for automatic track generation can also be loaded into the computer system 100 from other computer readable media. The term "computer readable medium" as used herein refers to any storage or transmission medium that participates in providing instructions and/or data to the computer system 100 for execution and/or processing. Examples of storage media include floppy disks, magnetic tape, CD-ROM, a hard disk drive, a ROM or integrated circuit, a magneto-optical disk, or a computer readable card such as a PCMCIA card and the like, whether or not such devices are internal or external of the computer module 101. Examples of transmission media include radio or infra-red transmission channels as well as a network connection to another computer or networked device, and the Internet or Intranets including e-mail transmissions and information recorded on Websites and the like.

The method of automatic track generation may alternatively be implemented in dedicated hardware such as one or more integrated circuits performing the functions or sub functions of automatic track generation. Such dedicated hardware may include graphic processors, digital signal processors, or one or more microprocessors and associated memories.

The disclosed arrangement for automatic track generation makes use of particular data structures to represent the relationship between media tracks. In these data structures, attributes controlling the generation of a dependent track are optionally indirectly associated with media elements of a source track. A media element, when
5 considering a video source track, typically comprises a video scene. Alternately, the media element could be based upon a video frame.

Fig. 2 shows an EDL 902. The EDL 902 is composed of EDL elements 901, ..., 907. Each EDL element 901 is associated with a media item 904 in a source media track 906. The source media track 906 comprises a sequence of media items 904, ..., 908. An
10 individual media item 909 comprises video frames 905. Each media item 904 in the source media track 906 has, as depicted by an arrow 903, a corresponding EDL element 901 in the EDL 902.

Fig. 2 also shows a dependent media item 911 that is "loosely synchronised", as depicted by a dashed arrow 910, with one or more of the media items 904, ..., 908 in the
15 source track 906. As previously noted, a source video item that is focussed on an actors lips needs to be tightly synchronised with a corresponding dependent audio item containing the actor's words. However, the dependent media item 911 in Fig. 2 is less tightly, i.e. more "loosely" coupled. This loose coupling is appropriate for dependent tracks such as a dependent background audio track that, while associated with a source
20 video clip, does not require tight coupling as is required in the case of an actor speaking. A dependent track is typically made up of a sequence of dependent media items 911, each media item 911 being generated by track control attributes in a corresponding sequence of EDL elements.

From an implementation perspective, the EDL element 901 is associated, as
25 depicted by the arrow 903, with the media item 904. According to a first arrangement

(also referred to as an "aggregated" arrangement as will be described with reference to Fig. B), a sequence of the EDL elements 901, ..., 907 contain track control attributes 912 which establish, as depicted by an arrow 913, the synchronisation between the dependent media item 911 and the source track 906.

5 According to the aggregated arrangement all the EDL elements in the source EDL 902 have track control attributes as depicted by a reference numeral 914. These track control attributes in the EDL elements 901, ..., 907 effect the behaviour of the dependent media item 911. In a second arrangement (also referred to as a "decoupled" arrangement as will be described with reference to Fig. C), some of the track control
10 attributes are incorporated into distinct EDL elements (referred to as track control elements) in the EDL of the source media track. In the decoupled arrangement some of the track control attributes are not included within the EDL elements for the media items.

 Returning to Fig. 2, the dependent media item 911 consists of media content that does not need to be closely synchronised with the source track 906. Often only the start
15 time and duration of the dependent media element 911 need to be synchronised to the source track 906. One example of a dependent track is a video overlay track, and dependent tracks will alternately be referred to as overlays in this description. This is an example only of a dependent track, however, and dependent tracks other than overlays can also be generated using the disclosed method. Examples of source tracks include
20 unprocessed (raw) video and dialog audio tracks.

 The track control attributes associated with the EDL elements 901, ... , 907 comprise (a) an attribute identifying the media from which the dependent media item 911 is to be generated and (b) attributes that serve to control commencement and termination of the dependent media item 911. The track control attributes (912, ..., 914) of the source
25 track 906 thus control (c) when the generation of the dependent media item 911 should

begin, (d) where the dependent media item 911 should end or (e) when new media should be used for a dependent media item, and (f) whether generation of the dependent media item 911 should be temporarily suspended.

One example of these track control attributes is set out in **Table 1**:

Name	Type	Description
Apply	Boolean	If this attribute is TRUE, the media referenced by the Generate Media attribute will be used from this point on, whenever it is permissible to generate a track. If the Suppress attribute is FALSE, the actual generation of the dependent track will begin from the start time of the media item that is associated with these attributes. If the Suppress attribute is TRUE, generation will not begin until a media item with the Suppress attribute set to FALSE is encountered. Generation using the referenced media continues until another media item with an Apply attribute set to TRUE is encountered, but it will be suppressed for media items with the Suppress attribute set to TRUE.
Suppress	Boolean	If this attribute is TRUE, generation is suppressed from the Start Time of the associated media item, for the duration of the media item.
Generate Media.	Media Reference	This references media to be used as a template for the media item to be generated. The generated media item will consist of a transformation of this media suitably extended or shortened to the required length. By convention, a reference to NULL or non-existent media causes track generation to be a null operation where no media is generated.

Table 1. Track Control Attribute Definitions

In the examples shown in Figs. A and B, the track control attributes conform to the aggregated approach, and form data fields within the EDL elements for the track media items. It is also noted that the track transformations referred to in the **Generate Media** entry in Table 1 can include trimming, looping, speeding up or slowing down video media items; omitting, selecting or duplicating still images; looping or selecting sub-sequences of audio and so on. The media used as a template for the dependent media track can be a media item or a series of media items.

Fig. A. shows a definition of an EDL element 201 for a media item (not shown) the EDL element 201 having track control attributes 204 therein. The EDL element 201 has a data field 204 that incorporates data fields 206-208 relating to the track control attributes for a dependent media item. If the duration of the source media item associated with the EDL element 201 is zero, then the media element is referred to as a "placeholder" since it can establish characteristics of a dependent media item without contributing anything to the source track.

Fig. B shows instances of two EDL elements 301 and 306 associated with the first two media items of a source track (not shown). The EDL element 301 is associated with a source media item 303 (designated as S1), and the track control attributes 302 incorporated into the EDL element 301 indicate that a dependent media item (not shown) referenced by the **Generate Media** attribute 304 will be loosely synchronised with the source media item 303. The EDL element 306 is associated with a source media item 305 (designated as C1), but does not generate a dependent media item, because the **Generate Media** field 307 is NULL as indicated by a reference numeral 308.

According to the first or aggregated arrangement used in Figs. A and B, all EDL elements for a source media track incorporate track control attribute fields. However, not

all these fields need play a part in generating, suppressing or modifying dependent tracks, this being determined by the value of their respective track control attributes as defined in **Table 1**. EDL elements which play some active role are depicted pictorially as S1, ..., SI (see for example 303 in **Fig. B**). EDL elements which play no active role are depicted
5 pictorially as C1, ..., CJ (see for example 305 in **Fig. B**).

The aggregated method of association depicted in **Figs. A and B** allows track control attributes to remain associated with EDL elements (for media items) by default. The decoupled approach allows EDL elements for media items to be somewhat separated from the track control elements (i.e. the EDL elements defining the track control
10 attributes). As noted, the data structures associated with the track control attributes in the decoupled arrangement are referred to as track control elements. The decoupling is not complete, as will be described in relation to **Fig. C**, as some track control attributes remain in the EDL element for the media item. In the decoupled arrangement part of the association between EDL elements for media items and track control attributes is
15 established by adjacency. EDL elements for media items and track control elements are intermixed in a list that is referred to as a modified EDL (to distinguish it from a "normal" EDL which does not contain track control data structures/elements). Track control attributes in this decoupled arrangement refer to the EDL element following them as depicted by 404 in **Fig. C** which associates the track control element 403 with the EDL
20 element 301'.

Fig. C shows, using the decoupled approach, EDL elements 301' and 306' that correspond to the EDL elements 301 and 306 respectively in **Fig. B**. In the aggregated arrangement, track control attributes are present in each EDL element in the source EDL. In order to render the track control attributes of a given EDL element in the aggregated
25 arrangement inoperative, the Boolean variables **Suppress** and **Apply** are given values of

FALSE, and the **Generate Media** variable is provided with a NULL reference (see for example the EDL element 306 and the field 308 in Fig. B). In the decoupled arrangement, the track control attributes can simply be omitted as is the case with the EDL element 306'. Accordingly, in this decoupled representation, absent attributes are
5 equivalent to NULL or FALSE control attributes in the aggregated arrangement in Fig B.

Having regard to the EDL element 301' in Fig. C it is evident that the track control attributes **Apply** and **Generate Media** have been removed and incorporated in a separate track control element 403 that contains the track control attributes 401. In this decoupled representation, absent attributes (ie the absence of a track control element
10 associated with the EDL element 306') are equivalent to null or false control attributes of Fig. B (as found, for example, in the EDL element 306). It is noted that variables **Suppress** and **Next**, (see 405 and 406 respectively in Fig. C) which are related to generation of dependent tracks, are still found in the EDL element 301'.

With this decoupled method a system, such as an editing arrangement
15 incorporating the disclosed track generation technique, may control whether associations between source tracks and dependent tracks remain or are broken. It should be appreciated that the track control attributes and the association itself can be refactored in different ways without affecting the track generation technique. In other words, the decoupling of the track control attributes 401 from the media item attributes 402 can be
20 performed in different ways without affecting the track generation technique.

Returning to Fig. 2, the EDL 902, which is associated with the source track 906, is processed by the track control software application running on the computer system 100 whenever it becomes necessary to update the dependent media item 911. This processing needs to be performed before the dependent media item 911 is previewed,
25 either on its own or as part of a composite production. In an editor that enables preview

of changes as soon as the changes are made, this source track processing is performed whenever the source track changes.

In order to generate the dependent media item 911, the source EDL 902 is processed in clip display order as depicted by an arrow 915, in order to determine
5 contiguous sequences of EDL elements which reference the same media, and thus define a range of the dependent generated media item 911. For every sequence of EDL elements generating a dependent media item, a portion of new dependent track, conforming to the duration and start time of the sequence of EDL elements, is generated using the media that is referenced by the relevant **Generate Media** attribute (see 710 in Fig. F).

10 When track control attributes of an EDL element assign to the attribute **Apply** a value of TRUE, any previous media in use in the dependent track is replaced. Provided that the attributes of the EDL element does not specify that the generation should be skipped for this media item (ie **Suppress** = TRUE), generation of the dependent track using newly referenced media will commence from the start point of the current media
15 item, otherwise the dependent track will begin from the start point of the first media item that permits overlaying (ie which permits generation of the dependent track). Generation of the dependent track will continue from that point on, being present for (ie synchronised with) all media items except those that have their **Suppress** attribute set to TRUE, until the generated media is either removed, replaced, or the end of the media item list (ie the
20 EDL) for the source track is reached.

The length of generated media item in the dependent track is determined by the length of sequences in the source EDL that permit generation. If the length of the media to be used for the dependent media item based on the **Generate Media** attribute does not conform to the duration of the source sequence it is being synchronised with, the
25 dependent track is extended or shortened in duration. For example, if the dependent

media item would be too long in duration, it may be trimmed. If the dependent media item would be too short, it will be repeated or looped to attain the required length, with the last instance being trimmed. It should be appreciated that these approaches are examples only, and there are other ways to extend or shorten media that can be used.

5 **Fig. Da** provides an example of generating a dependent track from a source track. A sequence of media items 502, 503, 519 ... of varying durations is depicted in increasing time order, depicted by an arrow 522, thereby forming a source track 501. The EDL elements (not shown) for the media items in the track 501 have various track control attributes. The assigned values of these attributes are defined in **Fig. E**. From a
10 terminology perspective, "X" means TRUE in **Fig. E**, and a blank entry means FALSE when considering the **Suppress** and **Apply** columns in **Fig. E**. Thus, for example, a media element 502 (designated as S1 in the left hand column 601 of **Fig. E**) has associated track control attribute values **Suppress** = TRUE, **Apply** = TRUE, and **Media Generation** = O1. Furthermore, a media element C1 in the column 601 of **Fig. E** has
15 associated track control attribute values **Suppress** = FALSE, **Apply** = FALSE, and **Media Generation** = NULL.

Returning to **Fig. Da** a dependent media item 514 is generated by track control attributes in the EDL elements associated with the source track 501. The dependent track 514 commences with a media item 504 with a designation "O1' " indicating that the
20 media item O1' is generated using a base media item O1. The media item 504 (ie O1 ') may, however, be different in length from the base media item O1. It is noted that both the dependent media item O1' (ie 504) and a dependent media item 507 (designated as O1'') are generated from the media item O1. A blank region 513 in the dependent track 514 indicates that no media item is generated in the noted area 513.

Fig. Db shows an amended source track 508, which is the source track 501 after a number of changes have been made thereto. Some of the changes are set out as follows.

(a) Media item 515 (ie S3 in the source track 501) and a media item 516 (ie C8 in the source track 501) have been moved to the start of the track 508. (b) A source media element 519 (ie C2 in the source track 501) has been deleted and thus does not appear in the amended source track 508. (c) The media element 505 (ie S2 in the source track 501) is replaced by a media element 520 (ie S4) in the source track 501). (d) An EDL for a media item 522 (ie C6 in the source track 501) is moved to the end of the EDL for the amended source track 508, and a media item 523 (ie C7 in the source track 501) is deleted. (e) A (new) media item 521 (ie S5 in the amended source track 508) is added.

The final outcomes of the above manipulations are as follows. The dependent media item 517 automatically travels, according to the disclosed track generation method, with the media item 515 (ie S3 in the source track 501) to form the dependent media item 510 (ie O2'' in a dependent track 518 that is loosely synchronised with the altered source track 508). The duration of the dependent media item 510 is automatically adjusted according to corresponding track control attributes in the altered source track 508. A gap is caused in the dependent track 518 generated between the start of the media item 520 (ie S4) and the start of a media item 521 (ie S5 in the amended source track 508). A track of new material 521 (ie O3' in the dependent track 518) is generated. O3''' is generated between S1 and S4.

Considering **Figs. Da, Db and E**, with respect to overlays it is noted that the attributes of S2 (refer to the fifth entry in the column 601 in **Fig. E**) do not affect which overlays should be applied (since the attribute **Generate Media** = NULL) except that it does not permit itself to be overlaid (since the attribute **Suppress** = TRUE). S4 (ie the

second last entry in the column 601 in Fig. E) is in effect a null overlay, since it begins a region where overlays will not be applied.

It is noted that the regions of overlays in the dependent track can be adjusted by operating on S1, S3, S4 alone. Each of S1, S2, S3, S4 act to define an end to regions that border on each other commence, by virtue that once an overlay is in effect it continues until overridden. Note also if C1, C2, C3 etc are deleted, copied or moved, the region of the respective overlay that encompasses them expands or contracts appropriately. Further note that this lack of explicit control allows the design decision of an author of automatic editing rules to continue to influence the results of the manual editing process.

Fig. F shows a track generation process 700 in flowchart form. The acronym EE is used in Fig. F to indicate the term "EDL element". The process 700 commences with a step 701 that sets a current EDL element index to the first EDL element. Thereafter, a testing step 702 determines whether the index lies beyond the last EDL element. If this is the case, then the process 700 follows a "yes" arrow to a stop step 713. Otherwise, the process 700 follows a "no" arrow to a step 703 which determines if the current EDL element permits (continued) generation of a dependent EDL element. In other words, this step checks if the **Suppress** attribute is FALSE. If so, then the process 700 follows a "yes" arrow to a step 704 that defines the starting index for generating the dependent media item to be the index of the current EDL element. If not, then the process 700 follows a "no" arrow from the step 703 to a step 705 that defines the starting index for generating the dependent media item to be the index of the EDL element following the current EDL element.

The process 700 is directed, from both the steps 704 and the step 705, to a step 706 which sets the end index for the dependent media being generated to be the index of the next EDL element after the current element with (**Apply** = TRUE) OR (**Suppress** =

TRUE). Thereafter, a step 707 determines whether the current EDL element has the attribute **Apply** = TRUE. If so, then the process 700 follows a "yes" arrow to a step 708 that saves the value of **Generate Media**. A following step 709 determines a media value previously saved by the step 708, on the present or a previous iteration and tests if there is
5 at least one EDL element between the start and end indices (as determined in the steps 704, 705). Returning to the step 707, if **Apply** NOT = TRUE then the process 700 follows a "no" arrow to the step 709.

If the stated condition for the step 709 is met, then the process 700 follows a "yes" arrow to a step 710 that generates a media item from the start time of the EDL
10 element referenced by the start index time of the EDL element referenced by the end index, until the end of the dependent track sequence. Thereafter, a step 711 advances the current EDL element item index to the next media item with attribute values (**Apply** = TRUE) OR (**Suppress** = TRUE). Returning to the step 709, if the condition is not met, then the process 700 follows a "no" arrow to the step 711. After the step 711, the process
15 700 follows an arrow 712 back to the step 702.

A Graphical User Interface (GUI) that is applicable to the track generation method in some cases is now described. The extent to which the GUI needs to provide user interaction with the track control attributes varies with the editing system in which the track generation technique is incorporated. In some editors, there is little or no need
20 for a GUI in regard to track control attributes. Thus, for example, in an editor that provides automatic editing facilities, the track control attributes can be set when automatic editing is applied, and the user need be given no further control over these attributes. In such a case, the automatic editing process can set the track control attributes as it considers appropriate.

For example, considering the source track 501 in Fig. Da, the auto-editor may automatically insert the clips S1, S2, S3, S4 and set the relevant track control attributes to use media O1, O2 which are video overlays. If the user moves, copies, or deletes these clips, S1, S3, S4 overlays will be similarly moved, copied or deleted according to the disclosed track generation method.

If desired, default track overlay media can also be defined to allow an overlay to be commenced before an EDL element applying an overlay is encountered. Note also that a user may concentrate on their main editing task without the need to consider overlays.

Fig. G shows an example 800 of a GUI for a manual editing arrangements, in which the user may interact with the track control attributes. Implementation of this GUI is particularly simple if the decoupled EDL arrangement depicted in Fig. C is used, however the GUI can be used with the aggregated EDL arrangement as well.

The GUI 800 provides representations 801, 802 of track control attributes on the same display where it depicts a story-board or timeline made up of media elements 803, 804.... The position of overlays can be adjusted by moving the indicators, 801, 802. An indication that dependent tracks are suppressed is also made available by modifying the appearance of those clip where overlays are suppressed, as shown in the shading of the GUI element 805. In this arrangement, a users can reposition dependent tracks simply by altering the position of the indicators 801, 802 such as by dragging them with a mouse to a new position. The user can also decide where to position media items based on the position of the track control indicators 801, 802, and therefore determine which dependent track is to apply to which media item. The user can also control the Suppress attribute in clips.

Industrial Applicability

It is apparent from the above that the arrangements described are applicable to the data processing industries.

The foregoing describes only some embodiments of the present invention, and
5 modifications and/or changes can be made thereto without departing from the scope and spirit of the invention, the embodiments being illustrative and not restrictive.

AUSTRALIA ONLY

In the context of this specification, the word "comprising" means "including principally but not necessarily solely" or "having" or "including", and not "consisting
10 only of". Variations of the word "comprising", such as "comprise" and "comprises" have correspondingly varied meanings.

The claims defining the invention are as follows:

1. A method of generating, in relation to a source placeholder, a dependent media item, said method comprising the steps of:
 - 5 determining, from an EDL element associated with the source placeholder, a plurality of track control attributes; and
 - establishing the dependent media item according to the track control attributes.
- 10 2. A method according to claim 1, wherein the source placeholder is a source media item.
3. A method according to claim 2, wherein the dependent media item is a graphical overlay.
- 15 4. A method according to claim 3, wherein the plurality of track control attributes are one of included in the EDL element, and referenced by a dependent track reference in the EDL element.
5. A method according to claim 3, wherein said plurality of track control attributes
20 includes an activation attribute and a reference to another media item.
6. A method according to claim 5, wherein the activation attribute comprises one of an apply attribute adapted to activate the dependent media item and a suppress attribute adapted to deactivate the dependent media item.

25

7. A method according to claim 6, wherein activation of the dependent media item occurs at one of (a) the boundaries of the source media item, (b) between the boundaries of the source media item, and (c) outside the boundaries of the source media item.
- 5 8. A method according to claim 5 wherein the other media item is a plurality of media items.
9. An apparatus for implementing any one of the above methods.
- 10 10. A computer program for directing a processor to perform any one of the above-noted methods.
11. Omnibus claims for the above-noted method, apparatus, and computer program.

15

DATED this twenty-first Day of March, 2003

Canon Information Systems Research Australia Pty Ltd

Patent Attorneys for the Applicant

SPRUSON&FERGUSON

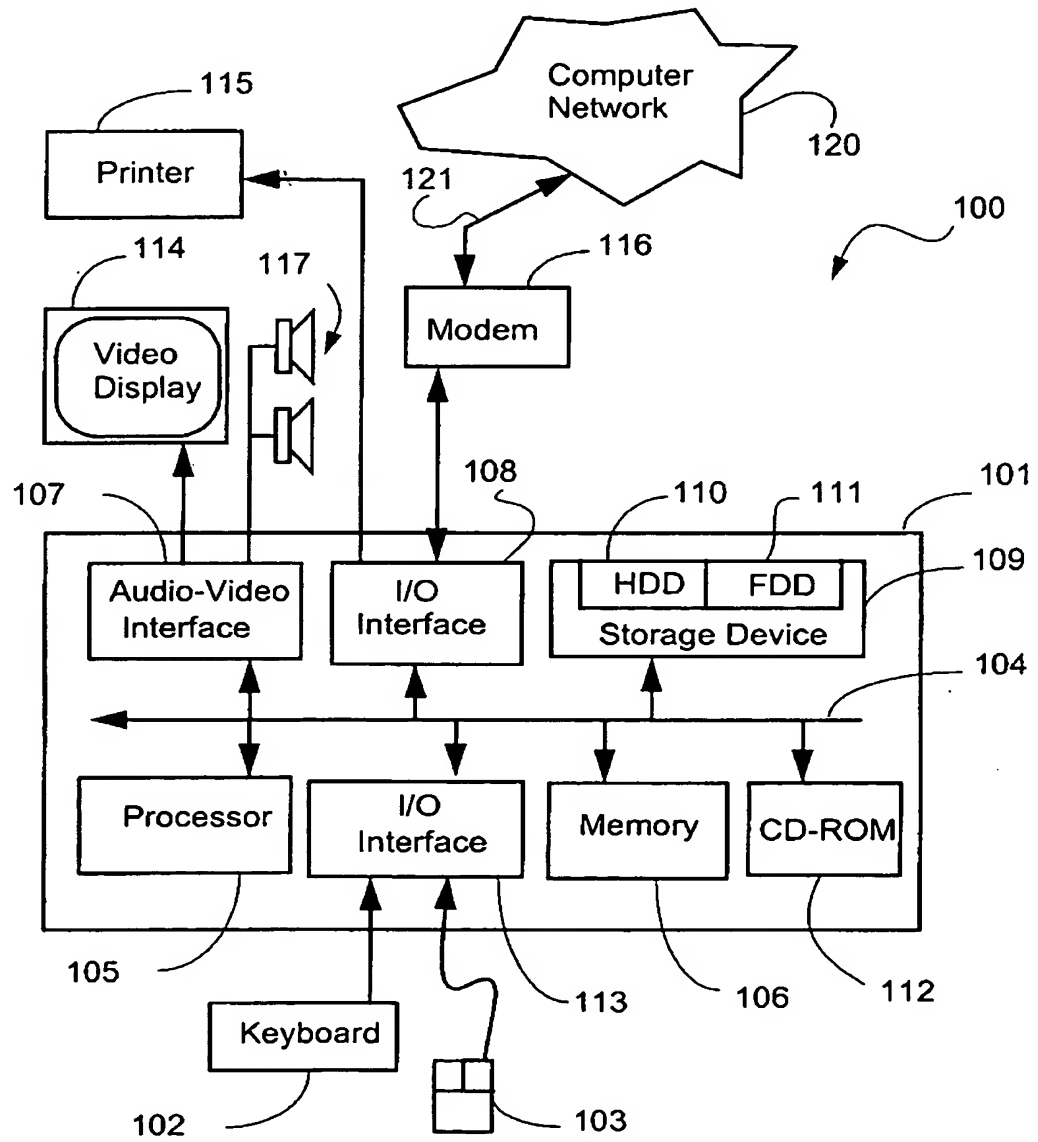


Fig. 1

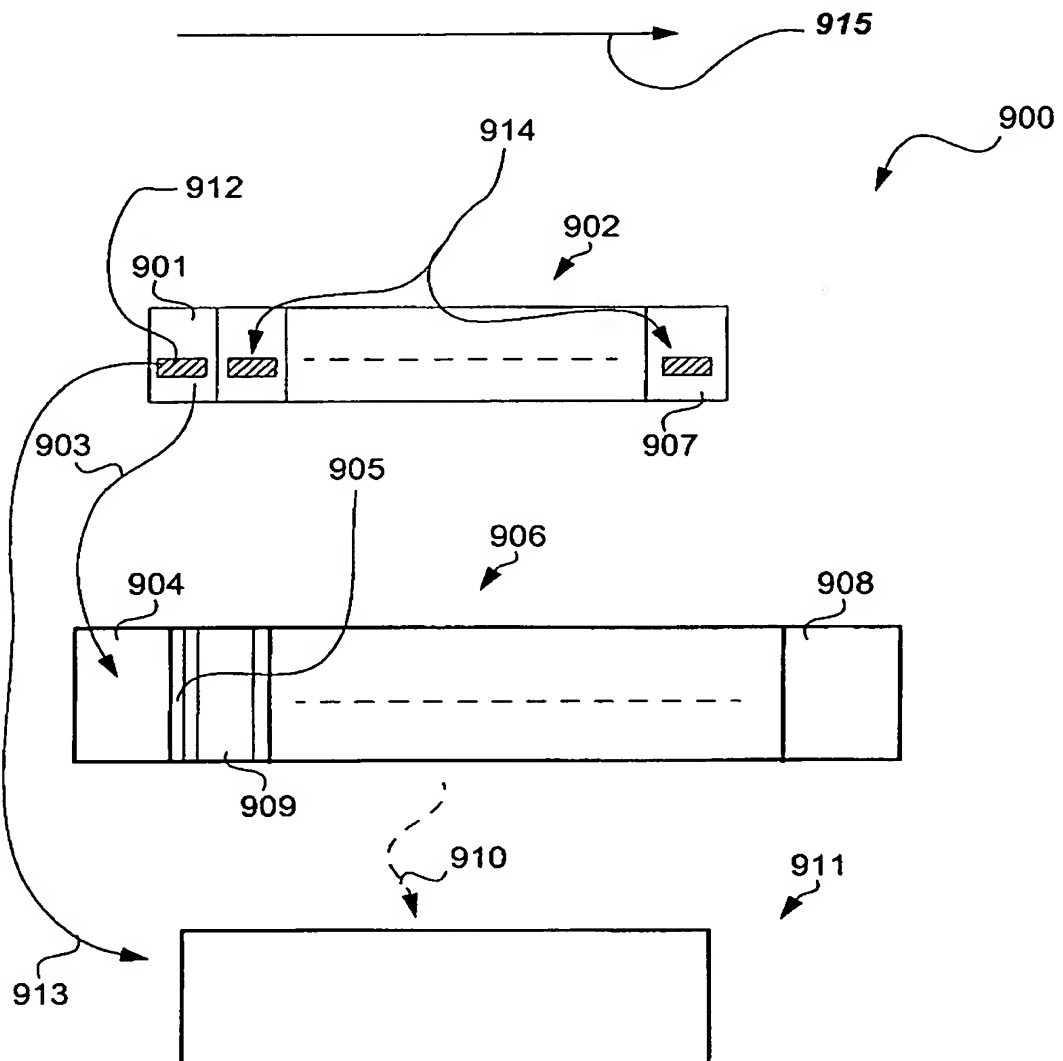


Fig. 2

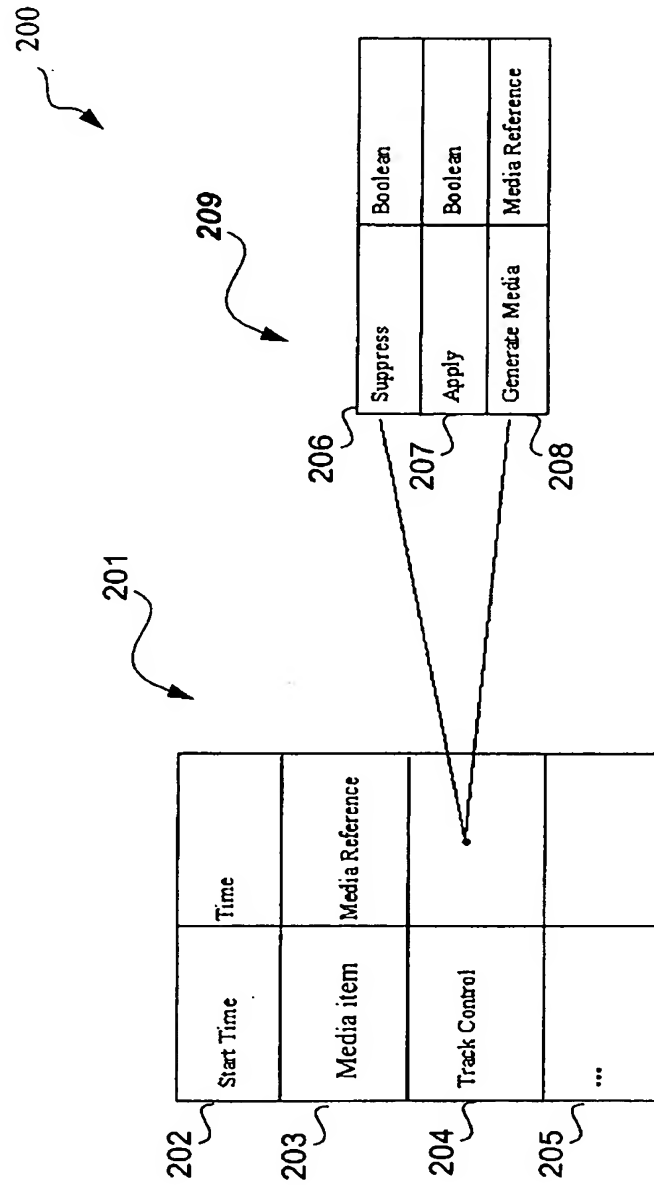


Fig. A

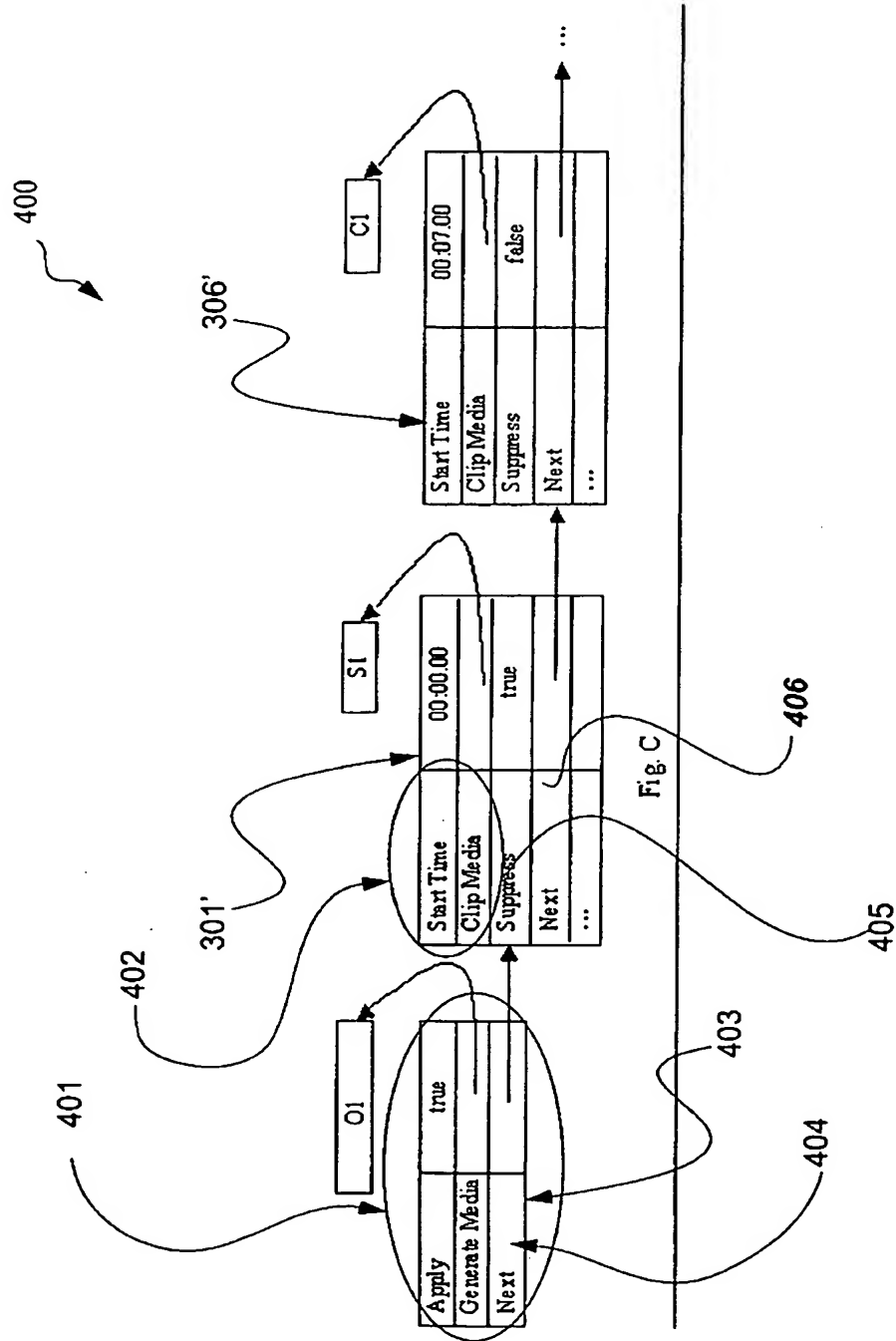


Fig. C

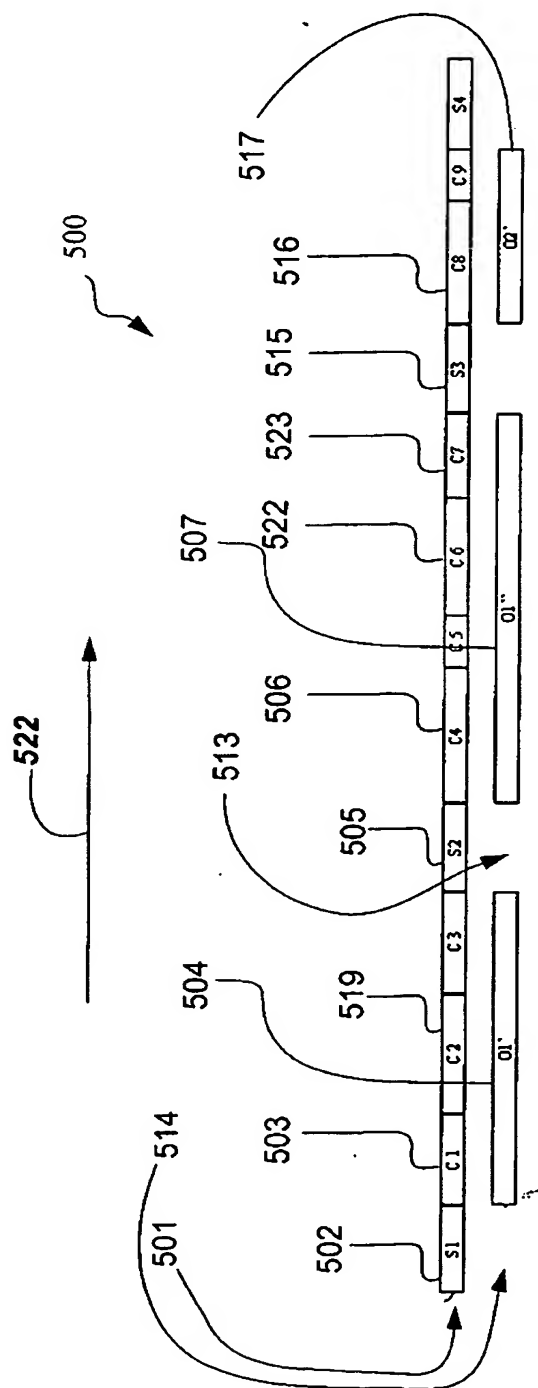


Fig. Da

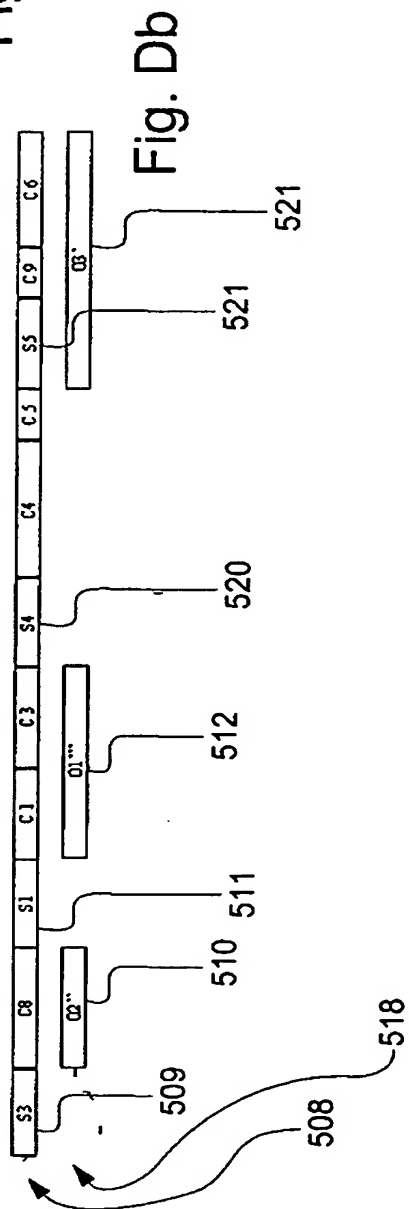


Fig. Db

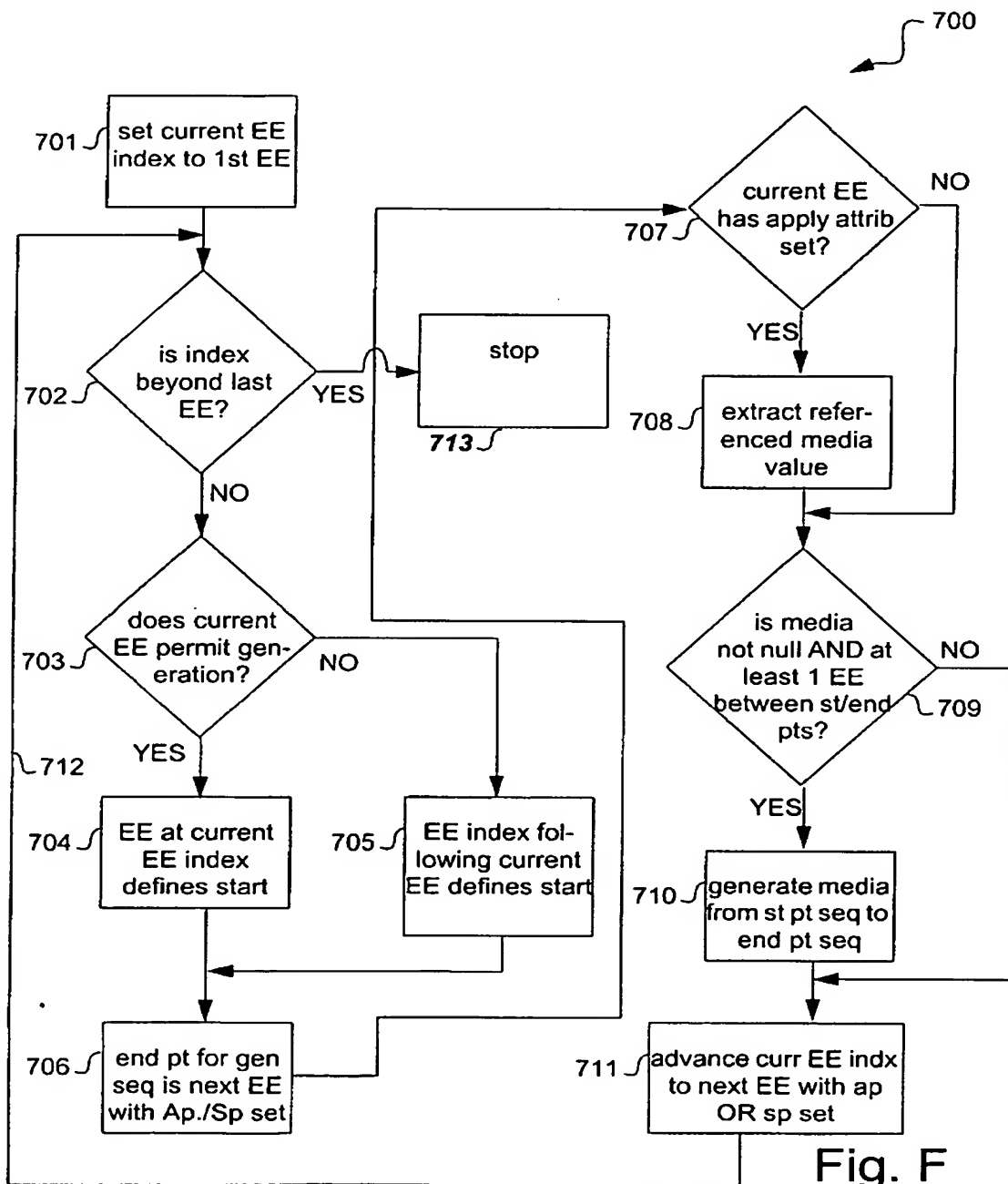
600

601

Clip Ref.	Suppress	Apply	Media
S1 - - - - -	-X	X	O1
C1			
C2			
C3			
S2 - - - - -	-X		
C4			
C5			
C6			
C7			
S3 - - - - -	-X	X	O2
C8			
C9			
S4 - - - - -	-X		
S5 - - - - -	-X		O3

Figure E.

Fig. E



800

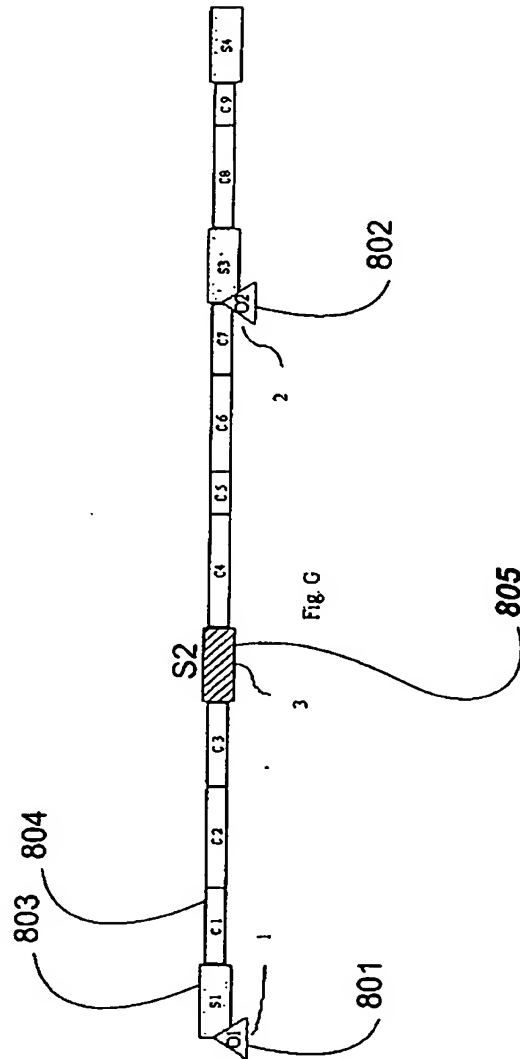


Fig. G